

This acrylic painting by Pierre Mion of the NASA Arts Program shows Level IV integration of the first Space Shuttle payload which will fly on the second mission, now scheduled for August 1981. Called OSTA-1 after its managing organization, the Office of Space and Terrestrial Applications, the pallet houses primarily Earth Resources experiments which the STS-2 crew and Houston flight controllers will operate.

## Mission 'rehearsals' set for next month

A "dress rehearsal" of the first Space Shuttle mission takes place in February to clear the way for launch of the Shuttle's first orbital flight.

The exercise will touch upon all segments of the mission including countdown and launch, ascent and orbital operations, and reentry and landing under normal and abort conditions.

This 11-day test series will involve operations at Kennedy Space Center, Johnson Space Center, Dryden Flight Research Center, and the White Sands Missile Range.

There are two major sections: The Test Countdown Demonstration Test/Flight Readiness Firing, which will include a 20-second test firing of the orbiter's three main engines; and a Mission Verification Test, which will be centered on flight and landing operations.

The STS-1 space vehicle Columbia and mobile launcher platform on which it rests were connected with ground services for the Pad Validation Test which began on Jan. 2. An extensive series of flight and ground system tests in January and early February set the stage for the 11-day dress rehearsal.

A "dry" launch simulation with the external tank unloaded and the prime crew onboard precedes the 11-day test. During this dry countdown, the space vehicle will go through the final five hours of the countdown to a simulated ignition and liftoff.

This preliminary test is primarily a check-out of flight and ground support electrical systems.

The Wet Countdown Demonstration Test/Flight Readiness Firing, all part of the Mission Verification Test, will exercise all elements of the nation's new Space Transportation System, including

personnel, facilities, space vehicle, and computer programs in a demanding, real-time environment to demonstrate the proper integration of all elements prior to the STS-1 mission, now scheduled for mid-March.

A launch date posted on calendars and flow charts means nothing unless all machinery, people, communications links, and computer software properly mesh to make it work. The Mission Verification Test for STS-1 is a full-operational demonstration of all elements which go into a Shuttle mission.

A directive issued by Space Shuttle Program Manager Robert F. Thompson stresses that the MVT "should not be planned as a training exercise," but as a demonstration of support readiness for first manned orbital flight. Each portion of the MVT will follow the actual STS-1 mission timeline as closely as possible.

In essence, the MVT is "everything but liftoff," one Shuttle spokesman said.

The complete test—CDDT/FRF—will sift out any failures or weaknesses in spacecraft and ground systems before launch day.

Conditions and timelines for the CDDT/FRF duplicate as closely as practicable those planned for STS-1 launch, and include tanking and detanking of Columbia and the external tank (hence "wet"), and full check-out of Launch Complex 39A.

Columbia's cabin will be unmanned once propellant loading begins, and orbiter systems will be remotely operated during the six-day CDDT.

A 20-second firing of Columbia's three main engines at throttle settings ranging from 94 to 100% thrust while the engines are tilted at their gimbals as they would be in flight for thrust vector control culminates the CDDT.

Following the CDDT/FRF simulated run, the Wet CDDT/FRF will start at T minus 72 hours and end when all propellants and cryogenics have been removed from the vehicle.

After the MVT, the STS-1 flight crew will return to JSC to take part in the seventh and final long-duration mission simulation.

### Sim report

The sixth long-duration simulation of the first flight of Columbia was conducted at JSC Tuesday-Thursday last week.

Columbia prime crew John Young and Bob Crippen were on station in the fixed-base Shuttle Mission Simulator in Building Five during the test. With ground-based flight controllers, the astronauts coped with a variety of simulated anomalies which involved each of the various disciplines represented in the Mission Operations Control Room in Building 30.

The exercise followed the STS-1 flight plan with the exception of a one-revolution-late deorbit for landing at Edwards AFB, Calif. That contingency was exercised when the flight crew detected a simulated irregularity in the state vector.

One more long-duration simulation is scheduled before the first flight of Columbia. That test is scheduled for Feb. 12-14.

By launch date, presently scheduled for March 17, Astronauts Young and Crippen will have spent over 1,300 hours in the Shuttle Mission Simulators, including both formal training time and integrated simulations.

## Final test article firing a success at NSTL

NASA's test version of the space shuttle's main propulsion system successfully completed on Saturday, Jan. 17, its last scheduled test firing before the shuttle's maiden flight planned for March. The test was conducted at the National Space Technology Laboratories, near Bay St. Louis, Miss.

The firing, which lasted 10 minutes, 25 seconds, was the twelfth and longest test of the system to date. It brings the total firing time on the main propulsion

test article to more than one hour — the equivalent of more than seven shuttle flights. This included six firings that were programmed to meet or exceed the duration necessary to put a shuttle into orbit.

The shuttle's main propulsion test article consists of three high-performance, liquid-fueled main engines mounted in a simulated tail section of an orbiter; a large external propellant tank; and associated hardware. The Shuttle's main propulsion system, together with its two

solid rocket boosters, will generate the thrust necessary to launch the vehicle on its flight to orbit.

With this firing, all main propulsion system test objectives for the first flight, and some objectives for later missions, have been achieved.

During the test, the cluster of three engines, equipped with flight type (77.5:1 expansion ratio) nozzles, was fired at 100% of rated power level for 235 seconds, at which time, one engine was shut down. This was done to simulate the inflight shutdown of an engine and an aborted mission where the crew would return the shuttle to the launch site for landing.

Gimballing and pogo pulsing were alternated during the firing. Gimballing is the movement of the engines to redirect their thrust and help steer the Shuttle during launch. Pogo pulsing is the intentional introduction of pressure pulses into the feedlines to test the propulsion system's ability to damp out oscillations which might occur in flight as a result of interaction of propellants, structural vibration modes, and vehicle flight acceleration.

The test was run by Rockwell International Space Operations personnel. Testing was done under the direction of the Marshall Space Flight Center, Huntsville, Ala., the NASA organization responsible for the development of the space shuttle main engines, external tank, and solid rocket boosters.

## EMU begins certification

Manned tests began last week to certify for flight the space suits and related support equipment astronauts will use during a space walk if problems arise outside the orbiter.

Additional crew training tests are expected to continue through mid-February with Astronauts Robert Crippen and John Young.

The suits are part of the extravehicular mobility unit (EMU), including the space suit assembly, the primary life support subsystem, emergency life support, and other crew items designed for venturing outside the orbiting spacecraft.

During the March mission, a spacewalk will be performed by Crippen only if the orbiter's payload bay doors are jammed by debris or fail to close.

In the event of an extravehicular activity (EVA), a tether would be connected

between the suited crew members and the orbiter.

The manned tests include the high pressure oxygen system, which was redesigned following a flash fire last year in the spacesuit secondary oxygen pack. The malfunction injured a technician.

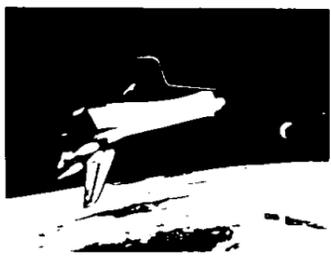
After an investigation, a NASA board recommended ways to improve safety and system reliability, although the cause was not found.

The high-pressure redesign included replacing shutoff valves with slow-opening regulators to eliminate valve "jolts."

Wherever possible, aluminum parts and housings have been replaced with monel (nickel and copper). Burrs and corners in tubing have been rounded out and silicone check valves replaced with teflon.

# Bulletin Board

Roundup deadline is the first Wednesday after publication.



The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees.

Editor: ..... Kay Ebeling

## Rosie returns

Rosie the Riveter has shown up on walls around the center.

JSC is involved in an energy reduction program which calls for a 50% reduction in energy use levels from base year 1973.

The Energy Office/Plant Engineering Division has called upon all JSC employees and contractors to assist in the energy reduction efforts, and everyone is responding.

JSC has achieved over 95% of its 50% energy reduction goal, but still has a short way to go.

The soon-to-be familiar poster of Rosie the Riveter is a Depart-

ment of Energy reprint of a World War II poster which symbolized America's readiness to roll up its sleeves and get the job done when the going got tough.

The poster reads: "We're Doing It! We're Saving Energy! Keep Up the Good Work."

## New Officers Announced by Toastmasters Spaceland

Toastmasters International, a communications and leadership organization, wishes to announce new officers for its Spaceland Club: President: Tony Zertuche; Educational Vice President: Pat Bahr; Administrative Vice President: Steve Jacobs; Secretary: Paulette Davidson; Treasurer: Helen Montgomery; and Sergeant at Arms: James Myers. They all welcome participation in this dynamic, educational, and motivational group. If you're interested in joining, or attending a session, they meet at Franco's Real Italian Restaurant (next to Red Lobster on NASA One) at 11:30 a.m. on the first and third Wednesday of each month. Contact Steve Jacobs at x3561.

## See a Presentation on a Study Tour of China

Sunday, Feb. 8, at 4 p.m., Doris Wood will conduct a slide show and lecture on an American Institute of Foreign Studies Tour

which will go to China and the Orient June 15 through July 12 this year. The meeting will be at 18127 Hereford Ln. in Nassau Bay and the public is invited. Call 333-2373 or x4464 for further information.

## Space History Conference to be held at Yale Feb. 6-7

A conference on the history of space activity will be held at Yale University, New Haven, Conn., on Feb. 6-7. The conference will be jointly sponsored by NASA and Yale's Calhoun and Jonathan Edwards Colleges. The conference will consist of four sessions: "Science, Technology and Management: The First Twenty Years;" "Literature and Themes in Space History;" "Domestic and International Ramifications of Space Activity;" and "The Rationale for Space Explorations." Further information on the conference may be obtained from: Ann Lindbeck, Room 463, Calhoun College, 189 Elm St., New Haven, Conn. 06510.

## Here's What's On Sale At the JSC Exchange Store

(Store hours 10 a.m. to 2 p.m.)  
Plitt Theatre tickets: \$2  
General Cinema tickets: \$2.40  
Postage Stamps: \$3/book  
Entertainment '81 Coupon Book: \$16

Gold C Values Book '80-81: \$5  
As of the first of the year, the price of business cards went up to \$12.50 for 250 cards. All business cards ordered before Jan. 1 will be sold at the old price, \$10.

Although the cafeteria in Building Three is closed for construction, the Gift Shop counter in that building is still open for employees and visitors. Store hours in Building Three are 8:30 a.m. to 4:30 p.m.

## What It Means to be a 'Professional Engineer'

As part of Engineers Week, a special event will take place Feb. 25 in the Building Two Auditorium at lunch hour. Woodrow Mize, P.E., will speak on the licensing of engineers in Texas and the Texas Engineering Practice Act. Mize is

## Ford Aerospace awarded for employment policies

Ford Aerospace and Communications Corp. has received the 1980 Industrial Professional Development Award from the Texas Society of Professional Engineers Bayou Chapter.

This award goes annually to that nominated company with the best engineering employment practices.

Robert Benware, Director of Ford Aerospace, will receive the award at an Engineers/Week Special Event Feb. 25 in the JSC Building Two Auditorium at 11:30 a.m.

Presenting the plaque to Mr. Benware will be Richard Little, President of the Bayou Chapter. Engineers Week will be celebrated Feb. 22 through 28.

Johnson Space Center received the TSPE Government Professional Development award in September 1978 after being nominated by the Bayou Chapter.

Engineers Week is sponsored by the NSPE and occurs annually the week of George Washington's birthday.

acting executive director of the Texas State Board of Registration for Professional Engineers. He will discuss the history of registration in Texas, what it means, how one becomes licensed, and the benefits of being acknowledged as a "Professional Engineer." The presentation will be from 11:45 to 1 p.m. and the public is invited. The Clear Lake Council of Technical Societies is sponsoring the event; for further information contact Robert Winkler at 488-5660.

## The Best Little Gem Show in Texas Comes to League City

The Clear Lake Gem & Mineral Society will present its sixth Annual Gem and Mineral Show on Feb. 7 and 8 at the Civic Center, 400 W. Walker in League City, Texas, from 9 a.m. to 9 p.m. on Saturday and from 10 a.m. to 6 p.m. on Sunday. The "Best Little Gem Show in Texas" will provide something for everyone to enjoy. Demonstrations of stone cutting and polishing, silversmithing, and faceting of gemstones will be taking place all during the day to show you how to change a dull uninteresting looking rock into a polished stone of exceptional beauty. For further information, contact W. L. Robinett at 333-7267 or 488-4294.

## Aero Club Has New Plane

The Aero Club now has a newer, more modern Cessna 150 trainer in addition to its four-place Cessna 172 cross country aircraft. Join the club and fly these aircraft at very advantageous rates. Contact Jerry Haptonstall for complete information at x5285.

## We Miss You at the Cafeteria

As you know, we are remodeling the Building Three cafeteria, and we estimate completion to be March 31, 1981.

In the Building 11 cafeteria we have added an additional serving line, because of this remodeling inconvenience. We've staffed all the lines with food servers to speed up the service.

We have also added more tables and chairs for your convenience.

If you try us after 12 noon, we will find the service fast, the food good, the price reasonable, and plenty of seating available.

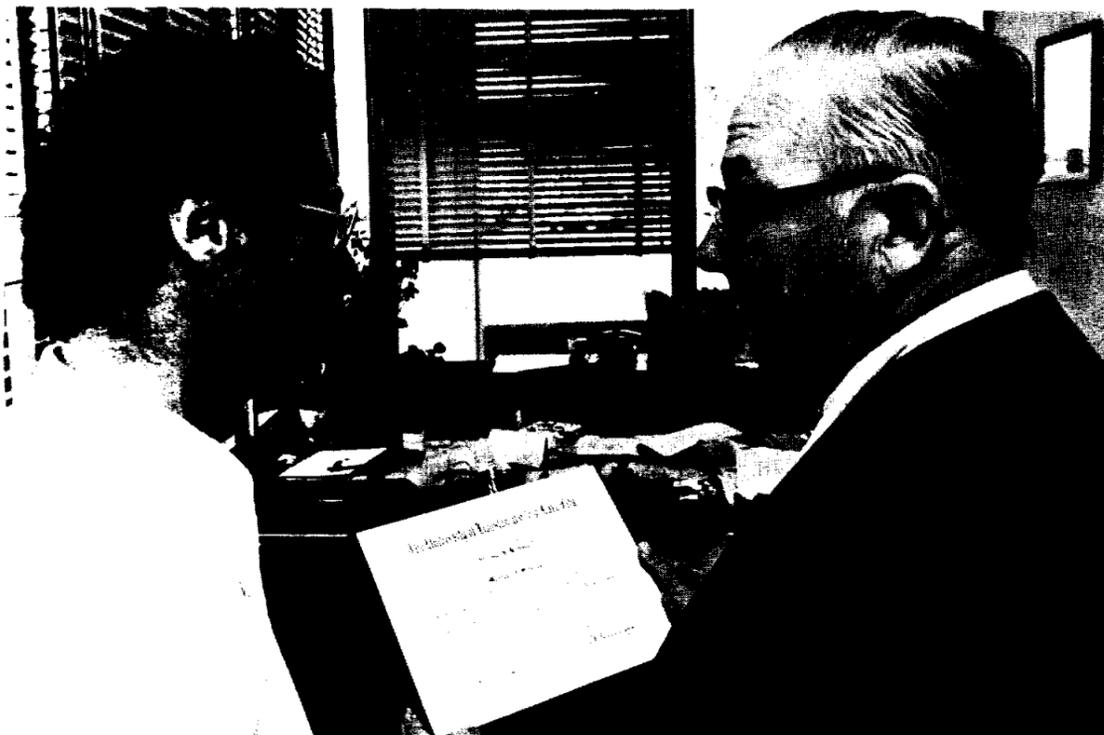
Hope to see you—soon.

Wally Grimes  
Exchange Operations  
Manager

## Ode to STS-1 crew

I'm your fan, a true believer,  
O Red Ryder and Little Beaver.  
Your upcoming ride on that Great White Pony  
Stands to be a fine testimony.  
To thousands of skeptics and numbers of doubters,  
Many complacent, yet others shouters.  
Awaken the sleepers and chase away fear  
As you gallop proudly through our space frontier.  
Your steed is a maiden, your mission a mountain,  
But optimism will flow anew as a fountain,  
When you bold scouts for two and a third days  
Glide confident over Earth's confusion and haze.  
Go, riders, Go Columbia and show all us peons  
Gateways to manna and knowledge for eons!

- Mike Gentry, AP4  
AV Services, Corp.



Jerry Hammack, Chief of the Safety Division, is one of many employees to take advantage of JSC's continuing education program. Shown here with the Chief of Employee Development, Stan Goldstein (left), Hammack displays his masters degree in Future Studies from the University of Houston at Clear Lake City. JSC sponsored Hammack for all of his course work, a service which is available to all JSC employees who want to further their education after working hours. For information, call John Rosales at x5266.

## Cookin' in the cafeteria

Week of February 2 - 6, 1981

**Monday:** Cream of Celery Soup; Braised Beef Ribs; Chicken a la King; Enchiladas w/Chili; Italian Cutlet (Special); Brussels Sprouts; Navy beans; Whipped Potatoes. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Beef & Barley Soup; Turkey & Dressing; Country Style Steak; Beef Ravioli; Stuffed Cabbage (Special); Corn Cobette, Okra & Tomatoes; French Beans.

**Wednesday:** Seafood Gumbo; Catfish w/Hush Puppies; Roast Pork w/Dressing; Chinese Pepper Steak (Special); Broccoli, Macaroni & Cheese; Stewed Tomatoes.

**Thursday:** Cream of Tomato Soup; Beef Tacos; BBQ Ham Slice; Hungarian Goulash; Chicken Fried Steak (Special); Spinach; Pinto Beans; Beets.

**Friday:** Seafood Gumbo; Liver w/Onions; Deviled Crabs; Roast Beef w/Dressing; Seafood Platter; Tuna & Noodle Casserole (Special); Whipped Potatoes; Peas; Cauliflower.

Week of February 9 - 13, 1981

**Monday:** French Onion Soup; Beef Chop Suey; Polish Sausage w/German Potato Salad; Breaded Veal Cutlet (Special); Okra & Tomatoes; Green Peas. Standard Daily Items: Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

**Tuesday:** Split Pea Soup; Shrimp Creole; Salisbury Steak; Fried Chicken (Special); Mixed Vegetables; Beets; Whipped Potatoes.

**Wednesday:** Seafood Gumbo; Fried Catfish w/Hush Puppies; Braised Beef Rib; BBQ Plate; Weiners & Beans; Shrimp Salad; Stuffed Bell Pepper (Special); Corn O'Brian; Rice; Italian Green Beans.

**Thursday:** Chicken Noodle Soup; Beef Stroganoff; Turkey & Dressing; BBQ Smoked Link (Special); Lima Beans; Buttered Squash; Spanish Rice.

**Friday:** Seafood Gumbo; Broiled Turbot; Liver w/Onions; Seafood Platter; Fried Shrimp; Meat Sauce & Spaghetti (Special); Green Beans; Buttered Broccoli; Whipped Potatoes.

\*\*Menu Subject to change without notices.

# 'She is the Rolls Royce of secretaries'

As a secretary in the Astronaut Office, Lynn Cross has 13 bosses.

They're an admittedly varied lot. She has to type material in engineering, medicine, physics, and astronomy. Plus the bosses travel a great deal and have complex schedules which are constantly changing. Calls come in from everywhere in that office, and she has to handle them with thoroughness and tact—sometimes three calls at once.

Cross' performance is outstanding, and she received the Outstanding Secretary award for December 1980.

Her 13 bosses recently pointed out her three outstanding characteristics:

1) "She treats us as individuals. She treats each of us as if he were

the only one." She remembers individual needs and idiosyncracies.

"Everybody is a person to Lynn."

2) She works unobtrusively—without supervision. "It is said of certain things that they are noticeable only by their absence."

"Lynn is a Rolls Royce of secretaries."

3) She never has a bad day. When the car breaks down and the babies are sick, Cross is always at her best.

"In four years we have never heard a complaint about her—or from her."

Cross received enthusiastic recommendation from her 13 bosses for the Outstanding Secretary award.



The hostages were airborne and the nation celebrated Jan. 20, including these yellow-ribbon-bedecked employees of Institutional Procurement (BB) and Procurement Operations (BL). Carol Turner brought ribbons for everyone, and she, along with Joyce Ecklund and Helen Montgomery, distributed them to the rest of the staff, who donned them as soon as the returnees became free.

## Gilruth Center offers more programs

**JSC vs. UHCLC** - The Recreation Center needs racquetball players to represent JSC in its continuing competition against UHCLC. The JSC team will consist of four men and three women. Matches will be played at UHCLC on Feb. 18 and 19. JSC leads the seven-event series 3-1. Call Carl McCollum at x3594 for more information.

**JSC WINS INTERCENTER RUN** - For the second time in a row, JSC has won the NASA-wide running competition. JSC finished first in both the two mile and 10 km running competition; Ames finished second in both events, and Goddard finished third in the two events. Medals are awarded

to the top three finishers in the NASA competition. JSC medal winners in the two-mile event were: Ruben Zavala, Herb Cottel, Kitty Havens, and Susan McGown. Medalists in the 10 km event were: Ruben Zavala, Herb Cottel, and Terry Helm.

**SATURDAY AT THE MOVIES** - Tickets are now on sale for the next children's movie at the Gilruth Rec. Center. Feature presentation will be Walt Disney's "North Avenue Irregulars." The program also includes cartoons, popcorn, and coke. Tickets are on sale at the Exchange Store in Building 11 at a cost of \$1 per person.

**EAA/BARC FUN RUN** - It's not too early to get in shape for the Feb. 28 Couples Medley Handicap Five-Mile Relay. Teams will consist of one male and one female. Cost is \$1 per person and race time is 9 a.m.. T-shirts will be awarded to the winners in each category.

### CLASSES

**SCUBA CLASS** - Register now for a seven-week scuba course beginning March 10. The course, taught by the JSC Scuba Club, will include lectures on Tuesdays from 6:30-9 p.m. and indoor pool time on Thursdays from 7-9:30 p.m..

Students who successfully complete the course will be certified by NAUI. Cost is \$75 which includes textbook, pool fee, and use of tanks. Students must furnish mask, fins, snorkel, and vest. Enrollment is limited to 20 students.

### BOATING SKILLS & SEAMANSHIP COURSE

This course will be taught by the U. S. Coast Guard Auxillary and will begin on Feb. 10 at 7:30 p.m.. Class meets for two hours every Tuesday for 13 weeks. Course covers topics vital to safe boating operation. Cost is \$6 for lesson material and text. Certificate of completion may entitle you to a boat insurance discount.



Lynn M. Cross

Outstanding Secretary

# Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

### MISCELLANEOUS

For Sale: Four 15X6 Steel wheels off of 1977 Cadillac & wheel covers. \$100. 482-7546.

Aquariums. 50-gal, two 20-gal, 10-gal. Includes unger-gravel & outside filters, pumps, full fluorescent hoods, heaters, gravel, stand, fish. \$200. 486-7873.

Service Manuals for '72 Chevrolet. Mechanical & Body. Both for \$5. 488-4463.

Trailer hitch. 5,500 lb capacity. 2-1/4" ball. Electric brake attachment. 941-8102.

Tire. One L78-15 unused. Goodyear polyglass belted, \$50.00. x-6313.

For Sale: Larry Dyke Prints. Complete set, signed & numbered. Phone 482-7546.

Pool table. All wood w/slate top. Includes 6 cues, rack, balls & chalk. \$400. Call 487-5395 after 6:30 p.m.

For Sale or Trade: Old Williams pin ball machine & Rockola Juke Box. Both repairable. Complete schematics. \$75 ea., 125 both. Scot x-3278 or 554-6148 after 5.

For Sale: Interstate battery, 24 month, never used. Reg. \$53 will sell for \$40. Will supply receipt and warranty. Tracey Haley wk-488-5544.

### CARPOOLS

Need one person for carpool. S. Loop 610/S. Wayside/Long Drive area. 8:00-4:30 shift. Non smokers. Helen, x-5447.

Need ride to building 4 area from 5715 Bellaire Blvd. Until car gets fixed. NASA x6376. Will pay for gas.

Want to form carpool from Alta Loma or Dickinson to Bldg. 13 or near facility. 8:00 to 4:30 shift. Teresa x3076 or 925-4751.

Need ride from La Marque to JSC Bldg. 15 everyday 7:30 to 4:15. 482-4950. Diane.

### BOATS

1977 24' Searay, Sundancer, loaded, excellent condition w/boat lift. Call 333-5373 or x3705 Kay. \$11,000 or best offer.

### CYCLES

For Sale: Honda Minibike-F-50 good condition \$1250. Scott x3278 or 554-6148 after 5.

### CARS & TRUCKS

'72 Malibu - auto, a/c ps, 4 barrel, 350, duals, new brakes, tires, air shocks, am/fm 8 track. \$1650 664-4877.

gal tank, low mileage seldom used, deluxe creampuff, sleeps four(4), raised roof. Must sell. C. H. Bowser x5557 or 486-4654 after 5.

Credit Union Repossessions: 1976 Briarwood Mobile Home-3 bedrooms-2 bath \$10,000.00; 1979 Mercury Cougar \$5,000.00; 1978 Oldsmobile Cutlass \$4,000.00; 1978 Honda CVC \$3,400.00; 1978 Ford Granada

### Pets

AKC reg. Toy Poodle, 4 yrs. old, black male, shots \$75 944-7042.

Free Puppies: Half Samoyed-half terrier, all white and black/white, 482-1635.

### STEREOS & CAMERAS

TV: Heathkit GR-295 23" color TV, assembly manual and extra tubes, \$225, 944-7042.

Car speakers, Jensen Triax, 6x9, 50 watt set of two still in box, new \$70 sell \$55 CW x4105, 643-8944.

Philips model ED-1261 8-track recorder, \$95. Both in very good condition. 486-8938 after 4.

### WANTED

Used IBM Selectric Typewriter. Call Howard Ashley x4551 or 554-6200.

2-1/4 x 2-1/4 lantern slide projector. Bean x3895.

Volunteer coaches needed for training local Special Olympics track team. Call Glenda at 337-2858 or leave message at 334-5595.

USED SET OF ENCYCLOPEDIAS. REASONABLE PRICE. Irma x3448 or 482-6659 after 5.

One non-smoking male roommate to share 2 bedroom/2 bath apt. at Fairwind-dishwasher, washer/dryer, furnished except bedroom 488-3314.

### PROPERTY & RENTALS

Lease: University Trace Condo, 2 br-2 bath, fireplace, wet bar, patio, washer & dryer, \$475. 483-2938 or 482-1228.

Lease: Dixie Hollow, 3-2-2, ceiling fan, inside utility rm, clean high & dry. \$425.00 plus deposit. 482-6609 after 4.

Lease: Heritage Park, 3-2-2, Wood fenced, fireplace, 11 mo new, \$485 mo plus deposit, 482-6609 after 4.

Sale: El Lago, newly reddecorated throughout 3-2, large recreation room, separate den and living room. \$80K, 334-3254.

For Sale: 1.2 acre lot in Polly Ranch Estates. Beautifully wooded. Call after 5 pm. 488-6433.

**GOING TO THE CAPE TO WATCH THE SHUTTLE LIFT-OFF???**

*Treat yourself — and your family — to a tour of Walt Disney World or A Caribbean Cruise while you're there.*

*Call or come by the SATO office Building One, Room 126 Ext. 3305*

20' 1975 Tioga minimotor home, 2 ac, sleeps 6, fully equipped, good condition asking \$7900. Scott x3278 or 554-6148 after 5.

For Sale: '76 Pacer, a/c, am/fm, 3-speed, 38,000 mi. \$2000. 483-2938 or 482-1228.

1978 Chev. Caprice, excellent cond. low mileage, blue, vinyl top, am/fm, ac, pb, ps, cruise control, split/reclining velour seats, below market value, 332-2291.

'66 Buick Skylark, auto, trans., pwr. brakes, steering SBR tires, well maintained, 87,000 miles, \$600. Phil, x4801 or 333-2476 after 5.

'74 Nova, white over blue two-tone, 350-V8, a/t, p/s, a/c. Very good condition. Tom x4551 or 332-7187 weekends/evenings.

'76 Oldsmobile Delta 88 Royale (cruise control, plush interior, excellent condition \$2295 Carson x4336 or 946-0319 after 5.

'78 Prowler travel trailer, 23-1/2', air conditioning awning, electric jack, antenna, plus many extras. \$4000. x2660, 554-6733.

77 Dodge Santana Van Camper, 30

\$3,800.00; 1975 Volvo \$2,400.00; 1976 Chevette \$1,500.00. For further information call Doris Feaster at the Credit Union.

### HOUSEHOLD ARTICLES:

Bunk Beds, maple finish, innerspring mattresses. Excellent condition. \$150.00 J. B. Hammack, 334-2986.

Sears 2-ton a/c \$130. Mahogany coffee table, \$25 Ted. 482-8827.

Sofa, good condition, cheap Stereo cabinet, real wood. \$50. Call after 5 p.m. 488-6433.

Double size mattress & boxspring set. Good condition. \$45.00. 333-5373 or x3705 Kay.

For Sale: Redwood root coffee table. Must see to appreciate. Firm \$300.00. Tracey Haley wk-488-5544.

### MUSICAL INSTRUMENTS

For Sale: Bontempi 19 chord organ, electric floor model, like new. \$65.00 554-6200 10 rings please.

For Sale: Upright Newman Piano \$350.00 332-8618 after 5.

Buecher alto saxophone-like new - \$350.00 554-2693 after 4:30.

GET HIGH..

BY SENDING YOUR COST REDUCTION IDEA ON A JSC FORM 1150 TO COST REDUCTION OFFICE, BE



Cartoon by Russ Byther

# Voyager 1 team completes mission report

This is Part II of the Voyager One mission summary.

## The Inner Moons: Mimas, Enceladus, Tethys, Dione, Rhea

Each of these five inner moons of Saturn is spherical in shape. Their densities and surface brightness indicate they are composed mainly of water ice. Tethys, in particular, seems to be almost pure ice, whereas Dione may range from 30 to 70% rock.

All five of these moons represent a size of body not previously explored by space probes - intermediate in size between Phobos and Deimos (Mars' moons) and the terrestrial-sized bodies: Mercury and the Moon. Their measured diameters, accurate to about 20 km (12 mi.), are: Mimas, 390 km (240 mi.); Enceladus, 500 km (310 mi.); Tethys, 1,050 km (650 mi.); Dione, 1,120 km (695 mi.); and Rhea, 1,530 km (950 mi.).

With the exception of Enceladus, all of these moons have heavily cratered surfaces, reminiscent of Earth's Moon and Mercury. Mimas has one very prominent crater which has a diameter almost one fourth that of Mimas itself. Stretching for 750 km (470 mi.) across the surface of Tethys is a 60 km (40 mi.) wide valley, which appears to be a fracture in the

crust of the moon. Several sinuous valleys, some of which appear to branch, are visible on Dione's surface.

Both Dione and Rhea have bright wispy streaks which stand out against an already high reflective surface. These are probably the result of fresh ice ejecta thrown out of more recent (on a geologic time scale) impact craters.

## Titan

Titan was thought to be the largest satellite in the solar system. It is now known to be smaller than Ganymede, largest of Jupiter's Galilean satellites. Its precise diameter is not yet known, but is less than 5,120 km (3,180 mi.), compared with Ganymede's 5,270 km (3,275 mi.). This implies a density twice that of water ice for Titan, requiring it to be an equal amount of rock and ice, as is Ganymede.

The surface cannot be seen because it is hidden by a dense haze at least 280 km (175 mi.) thick.

The atmospheric pressure near Titan's surface is 50% greater than that of Earth.

The atmosphere of this unique moon contains methane, ethane, acetylene, ethylene, and hydrogen cyanide; but the bulk of the atmosphere is now believed to be composed of nitrogen, the main constituent of Earth's atmosphere.

## Voyager 2 will go to Uranus

NASA has officially approved the continuation of Voyager Two on a trajectory which would take it to Uranus in 1986 after flying past Saturn this summer.

Under the approved plan, the spacecraft will encounter Uranus at a distance of 107,000 kilometers (66,000 miles) Jan. 24, 1986, making measurements and taking pictures as it speeds past and heads for a possible encounter with Neptune.

The Uranus encounter will provide the world with its first close-up look at that planet. Uranus is the seventh planet outward from the Sun, twice as far from the Sun as Saturn; it rotates on its axis at a tilt of 98 degrees. It is a grim, frozen world.

The decision to fly past Uranus is, in effect, a decision to retain the present trajectory. If agency officials had decided against a Uranus encounter, then a retargeting of the Voyager Two would have been required.

Lakes of liquid nitrogen may exist near the poles of this strange world, whose surface temperature is probably 90 K (-300 F), only slightly warmer than the boiling point of liquid nitrogen.

Titan has no intrinsic magnetic field, and therefore possesses no large liquid conducting core. Titan does serve as a source of charged particles in Saturn's magnetosphere, but only in the amount of about one ounce per second.

## The Outer Moons: Hyperion and Iapetus

The masses of Hyperion and Iapetus are poorly known, so their densities are quite uncertain. However, it is very likely that they too are mainly water ice. Their

surfaces are somewhat less reflective than the inner moons, but still much more reflective than our own Moon, which reflects only 4% of the light it receives from the Sun.

Iapetus is peculiar in that it has one bright and one dark hemisphere. The dark side, which faces in the forward direction as Iapetus circles Saturn, reflects only one-fifth as much as the bright trailing side.

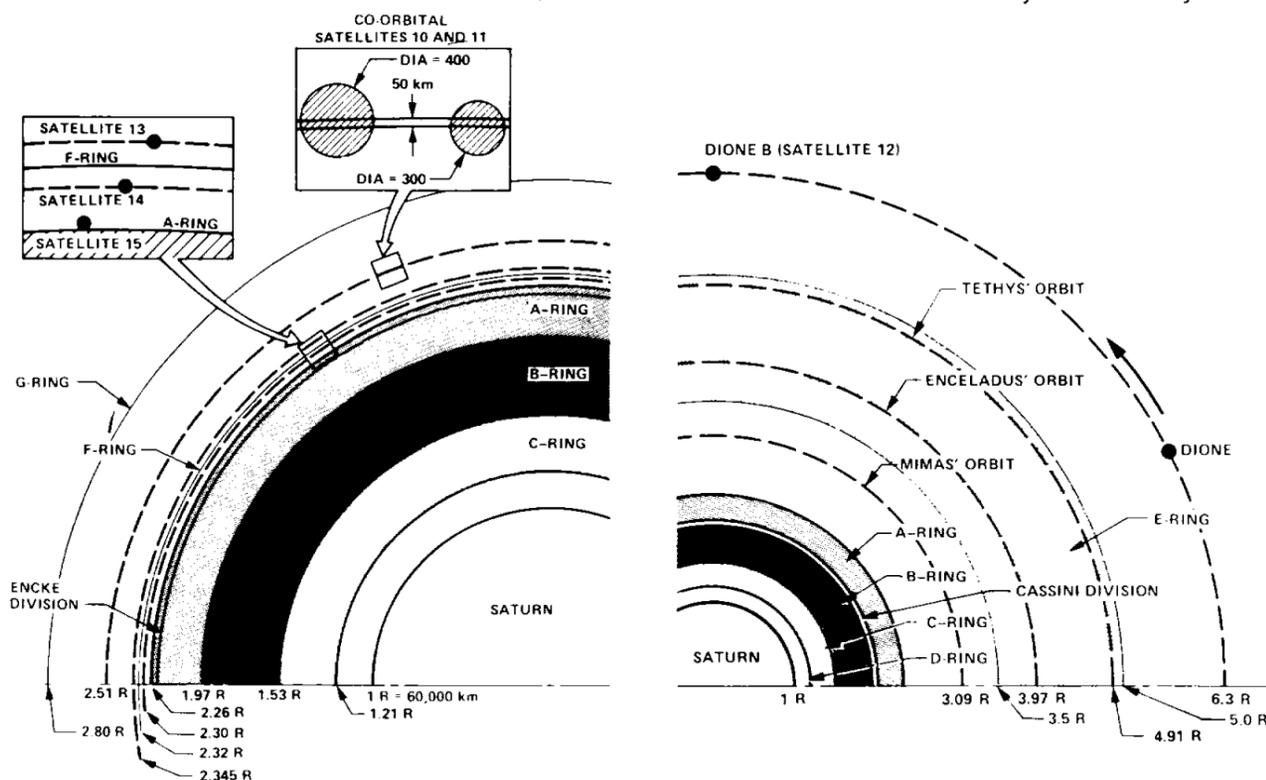
Hyperion has a diameter of about 310 km (190 mi.), Iapetus a diameter of about 1,440 km (890 mi.).

## The Magnetosphere

Although it is only about one-third the size of Jupiter's, the magnetosphere of Saturn is nevertheless an enormous structure, extending nearly a million miles inward from the planet toward the Sun before the flow of charged particles in the solar wind overcomes the effects of Saturn's magnetic field. As in the case of Jupiter's magnetosphere, charged particles in Saturn's are dragged along by the magnetic field and circle Saturn once every 10 hours 39 minutes. At the orbital distance of Titan, these charged particles speed by Saturn's largest moon at more than 193 km (120 mi.) per second.

The size of the magnetosphere fluctuates rhythmically as the solar wind increase or decreases in intensity, with the result that at times Titan finds itself outside of Saturn's magnetosphere altogether.

Surrounding Titan and its orbit and extending inward to the orbit of Rhea is an enormous cloud of uncharged hydrogen atoms forming a torus or ring, of ultraviolet-emitting particles. Because they are uncharged, these atoms are not dragged along by Saturn's magnetic field as it rotates, but rather orbit as countless minuscule moons around Saturn.



## NASA demonstrates space technology to industry

One of the unparalleled products of NASA as a government agency is the concept of technology transfer—where systems developed for use in the government space program are applied in Earth based industries.

Last week JSC hosted a conference for representatives of major American industries sponsored jointly by NASA and the American Institute of Aeronautics and Astronautics. Representatives of Exxon, Dow Chemical, IT & T, Johnson & Johnson, Xerox, Teledyne, 3M, and numerous other corporations heard briefings on organization of an avionics

simulation lab, on materials that will be developed in space, on designing a life support system for a space suit, on the "Electromechanical Alternative for Conventional Hydraulic Actuators," and other topics related to JSC's work.

One of the most evident areas of technology transfer is in JSC's Earth Resources Divisions where satellite observations can predict trends in crop growth, metal deposits, and sources of oil—the topic of one of the afternoon sessions.

Another, near future form of technology transfer will be in pharmaceutical

production in Earth-orbiting laboratories, a topic which Dennis Morrison covered in the same session with the industry representatives.

Bryan Erb of Earth Resources briefed the group on Satellite Observation of Agriculture, a NASA project which has resulted in three specific highly developed technological methods: data acquisition from space, extraction of the information from the data, and analyzing the information.

Space scientists anticipate advancements in information extraction and future equipment—sensors and platforms—as a result of JSC managed projects such as AgRISTAR, which is budgeted for continued operation through 1987.

Every feature on the Earth has a characteristic signature, which sensors on the orbiting platform can read and transmit to Earth. With this data, scientists and engineers can estimate growth and yield of crops—make mathematical models on a worldwide network.

LACIE (the Large Area Crop Inventory Experiment) demonstrated the technology in 1974-78, and AgRISTAR will carry the measurements further, developing ways to read thermal conditions, predict soil moisture, and analyze agriculture in the visual spectrum.

"One measure of the success of this project will be in the ways industry finds the techniques useful and profitable," Erb said. He added that in the next 20 years there will be a worldwide remote sensing system for management of the Earth's resources.

"All you need to know is the signature," Erb said, "and the computer has to be able to find it."

In pharmaceuticals, the advantage of operations in space will be in the mixing and diffusion of free fluids which will not mix under the constraints of gravity. Also, on the ground, work with living cells and proteins—elements necessary for development of antidotes for numerous diseases—is limited to a micro-biological level.

"In space we'll be working with larger concentrations," Morrison said, "which will result in a 20 to 50% improvement."

He said that kidney, pituitary, and pancreatic cells are among the first candidates for near-term spaceflight, although weight limitations at first will delay initial commercial processing.

Products such as immunoglobulins, beta cells, and enzymes now produced by kidney cells are available in hospitals today, but at astronomical costs.

## Manned Flight Awareness

The last in a series of 12 static firings of the main propulsion engines was successfully completed Jan. 17. (See related story page 1.) This removes the constraint to launch that had been placed on the engines. The 10-minute firing at NSTL met all objectives, including gimbaling and one engine-out tests.

Milestone tests recently completed at KSC were:

Shuttle/pad interface: successful.  
Ground power-out test: successful.

APU servicing and confidence runs: successful.

Liquid hydrogen/liquid oxygen (LH<sub>2</sub>, LO<sub>2</sub>) tank/detank testing completed on Jan. 24. There were minor problems, as in all first attempts; however, the overall test was considered highly successful.

During the next two weeks, the major milestone to be accomplished in order to meet the March launch date is the FRF (Flight Readiness Firing).